Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for determining state of charge of plural series connected electrical energy storage units comprising:

applying a non-dissipative load to a selected storage unit in a string of electrical energy storage units, resulting in an energy transfer between the selected storage unit and the string of storage units through the non-dissipative load; and

determining state of charge of the selected unit from voltage and current data of the selected storage unit resulting from the energy transfer, the state of charge of the selected unit being a fraction of a fully charged capacity of the selected unit.

2. (Original) The method of claim 1 wherein the energy is transferred by pulsed currents.

3. (Original) The method of claim 1 wherein determining the state of charge of the selected storage unit comprises:

calculating an impedance of the selected unit from the voltage and current data obtained during the energy transfer.

4. (Currently Amended) A method for balancing state of charge among plural series connected electrical energy storage units, comprising:

applying a non-dissipative load to a selected storage unit in a string of electrical energy storage units, resulting in an energy transfer between the selected storage unit and the string of storage units through the non-dissipative load;

determining state of charge of the selected unit from voltage and current data of the selected storage unit resulting from the energy transfer, the state of charge of the selected unit being a fraction of a fully charged capacity of the selected unit; and

when the state of charge of the selected unit is different than a target state of charge, transferring energy between the selected unit and the string of storage units, such that the state of charge of the selected unit converges toward the target state of charge.

5. (Original) The method of claim 4, comprising:

applying an up-converter to the selected storage unit; and

transferring units of energy from the selected storage unit to the string of storage units.

6. (Original) The method of claim 4, comprising:

applying a down-converter to the selected storage unit; and

transferring units of energy from the string of storage units to the selected storage unit.

7. (Original) The method of claim 4, wherein determining the state of charge of the selected storage unit comprises:

calculating an impedance of the selected storage unit from the voltage and current data obtained during the energy transfer.

8. (Original) The method of claim 7, wherein determining the state of charge of the selected storage unit further comprises:

applying the non-dissipative load to the selected storage unit;

determining a first voltage across the selected storage unit;

determining a first current flowing through the selected storage unit;

determining a second voltage from the first current and impedance of the selected storage unit; and

determining the state of charge based on a voltage difference between the first and second voltages.

9. (Original) The method of claim 4, wherein the energy is transferred by pulsed current.

10. (Original) The method of claim 4, wherein each of the storage units is a storage cell.

11. (Original) The method of claim 4, wherein each of the storage units is a battery module.

12. (Original) The method of claim 4, wherein one or more of the storage units comprise a battery pack.

13. (Original) The method of claim 4, wherein for each storage unit in the string having a number of storage units, comprising:

applying the non-dissipative load to a selected storage unit, resulting in an energy transfer between the selected storage unit and the string of storage units through the non-dissipative load; and

determining an impedance of the selected storage unit from voltage and current data of the selected storage unit obtained during the energy transfer.

14. (Previously Presented) The method of claim 13, further comprising:

determining a string impedance from the determined impedance of each storage unit;

determining a first string voltage and string current from the string of storage units;

determining a second string voltage from the string current and the string impedance;

determining a string voltage difference between the first string voltage and the second string voltage; and

determining a target state of charge as the average state of charge for the storage units of the string.

15. (Original) The method of claim 14, further comprising:

selecting a storage unit from the string of storage units having a state of charge that is different from the target state of charge;

transferring energy between the selected storage unit and the string of storage units, such that the state of charge of the selected unit converges toward the target state of charge.

16. (Original) The method of claim 15, wherein selecting a storage unit from the string of storage units having a state of charge that is different from the target state of charge, comprises:

comparing each of the states of charge of the individual storage units with the target state of charge; and

selecting a storage unit having a state of charge most different from the target state of charge.

17. (Original) The method of claim 15, wherein selecting a storage unit from the string of storage units having a state of charge that is different from the target state of charge, comprises:

selecting a storage unit having a state of charge that is different from the target state of charge from the string of storage units in a sequential order.

18. (Original) The method of claim 15, wherein transferring energy between the selected storage unit and the string of storage units, comprises:

comparing the state of charge of the selected storage unit with the target state of charge;

when the state of charge is less than the target state of charge, transferring energy from the string of storage units to charge the selected storage unit; and

when the state of charge is greater than the target state of charge, transferring energy from the selected storage unit to charge the string of storage units.

19. (Original) The method of claim 18, comprising:

when the state of charge is less than the target state of charge, transferring energy from the string of storage units to charge the selected storage unit until a charge time expires.

20. (Original) The method of claim 18, comprising:

when the state of charge is greater than the target state of charge, transferring energy from the selected storage unit to charge the string of storage units until a discharge time expires.

21. (Currently Amended) A system for determining state of charge of plural series connected electrical energy storage units, comprising:

a circuit configured to apply a non-dissipative load to a selected storage unit in a string of electrical energy storage units, resulting in an energy transfer between the selected storage unit and the string of storage units; and

a controller configured to determine state of charge of the selected unit from voltage and current data of the selected storage unit resulting from the energy transfer, the state of charge of the selected unit being a fraction of a fully charged capacity of the selected unit.

22. (Original) The system of claim 21, wherein the energy is transferred by pulsed current.

23. (Previously Presented) The system of claim 21, wherein the controller is further configured to calculate an impedance of the selected storage unit from the voltage and current data obtained during the energy transfer.

24. (Currently Amended) A system for balancing state of charge of plural series connected electrical energy storage units, comprising:

a circuit configured to apply a non-dissipative load to a selected storage unit in a string of electrical energy storage units, resulting in an energy transfer between the selected storage unit and the string of storage units; and

a controller configured to determine state of charge of the selected unit from voltage and current data of the selected storage unit obtained during the energy transfer, the state of charge of the selected unit being a fraction of a fully charged capacity of the selected unit; and to direct the non-dissipative load to transfer energy between the selected storage unit and the string of storage units-when the state of charge of a selected unit is different than a target state of charge such that the state of charge of the selected unit converges toward the target state of charge.

25 (Previously Presented) The system of claim 24, wherein the non-dissipative load is an up-converter configured to transfer units of energy from the selected storage unit to the string of storage units.

26. (Previously Presented) The system of claim 24, wherein the non-dissipative load is a down-converter configured to transfer units of energy from the string of storage units to the selected storage unit.

27. (Previously Presented) The system of claim 24, wherein the controller is further configured to calculate an impedance of the selected storage unit from the voltage and current data obtained during the energy transfer.

28. (Previously Presented) The system of claim 27, wherein:

the circuit is configured to apply the non-dissipative load to the selected storage unit

and the controller is further configured to determine a first voltage across the selected storage unit, a first current flowing through the selected storage unit, a second voltage from the first current and impedance of the selected storage unit, and

the state of charge based on a voltage difference between the first and second voltages.

29. (Original) The system of claim 24, wherein the energy is transferred by pulsed current.

30. (Original) The system of claim 24, wherein each of the storage units is a storage cell.

31. (Original) The system of claim 24, wherein each of the storage units is a battery module.

32. (Original) The system of claim 24, wherein one or more of the storage units comprise a battery pack.

33. (Previously Presented) The system of claim 24, wherein for each storage unit in the string having a number of storage units:

the circuit is configured to apply the non-dissipative load to a selected storage unit, resulting in an energy transfer between the selected storage unit and the string of storage units; and

the controller is configured to determine an impedance of the selected storage unit from voltage and current data of the selected storage unit observed from the energy transfer.

34. (Previously Presented) The system of claim 33, wherein the controller is further configured to determine:

a string impedance from the determined impedance of each storage unit;

a first string voltage and string current from the string of storage units;

a second string voltage from the string current and the string impedance;

a string voltage difference between the first string voltage and the second string voltage; and

a target state of charge as the average state of charge for the storage units of the string.

35. (Currently Amended) The system of claim 24, wherein the controller is further configured to:

select a storage unit from the string of storage units having a state of charge that is different from the target state of charge; and

direct the non-dissipative load to transfer energy between the selected storage unit and the string of storage units, such that the state of charge of the selected unit converges toward the target state of charge.

36. (Previously Presented) The system of claim 35, wherein the controller is further configured to:

compare each of the states of charge of the individual storage units with the target state of charge; and

select a storage unit having a state of charge most different from the target state of charge.

37. (Previously Presented) The system of claim 35, wherein the controller is configured to: select a storage unit having a state of charge that is different from the target state of charge from the string of storage units in a sequential order.

38. (Previously Presented) The system of claim 35, wherein:

the controller is configured to compare the state of charge of the selected storage unit with the target state of charge. to direct the non-dissipative load to transfer energy from the string of storage units to charge the selected storage unit when the state of charge of the selected storage unit is less than the target state of charge, and to direct the non-dissipative load to transfer energy from the selected storage unit to the string of storage units to charge the string of storage units when the state of charge of the selected storage unit is greater than the target state of charge.

39. (Previously Presented) The system of claim 38, wherein:

the controller is further configured to direct the non-dissipative load to transfer energy from the string of storage units to charge the selected storage unit until a charge time expires when the state of charge is less than the target state of charge.

40. (Previously Presented) The system of claim 38, wherein:

the controller is further configured to direct the non dissipative load to transfer energy from the selected storage unit to charge the string of storage units until a discharge time expires when the state of charge is greater than the target state of charge.

41. (New) The method of claim 1, wherein the state of charge of the selected unit is determined by taking the difference between a loaded voltage and a product of a current of the selected unit and a present impedance of the selected unit.

42. (New) The system of claim 21, wherein the state of charge is the difference between a loaded voltage and a product of a current of the selected unit and a present impedance of the selected unit.